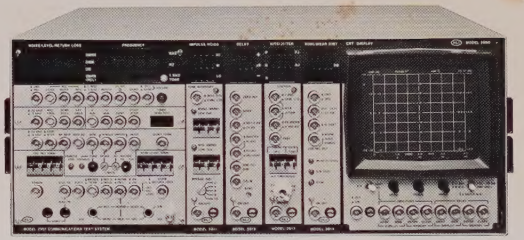
BB/01
3900/3901

CONDENSED OPERATING INSTRUCTIONS
MODEL 3901
COMMUNICATIONS TEST SYSTEM
BASIC UNIT



HEKIMIAN LABORATORIES, INC.
9298 GAITHER ROAD
GAITHERSBURG, MARYLAND 20877 USA

Telephone (301) 840-1217
Telex 89-8399

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PART NO. 3901-M10
Issue 2, January 1978

PART NO. 3901-M10
Issue 2, January 1978

1. GENERAL

A. SECTION HEADINGS

1. BLACK — General Information
2. GREEN — Receive Functions
3. BLUE — Send Functions

B. SWITCH POSITIONS

SWITCH TO IN POSITION

SWITCH TO OUT POSITION

SWITCH TO POSITION INDICATED IN TEXT

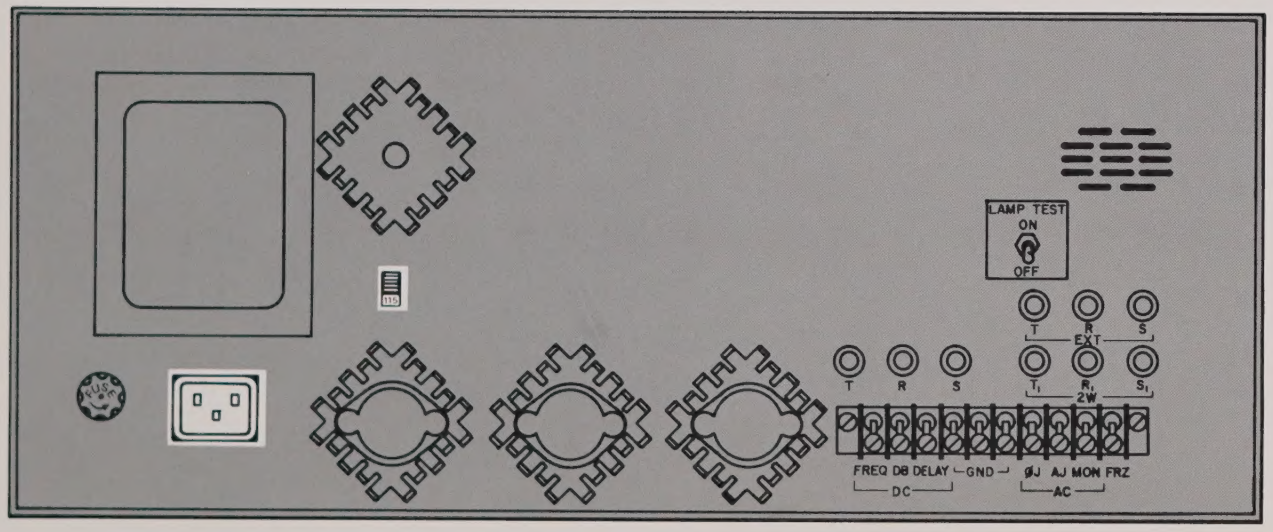
C.

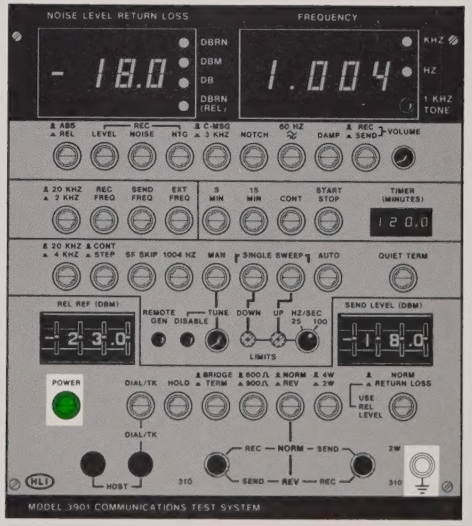
1. Refer to the Operating Instructions for complete description of controls and indicators not mentioned in these Condensed Operating Instructions.
2. Procedures described in these Condensed Operating Instructions are limited to the more commonly made measurements. For more complete instructions on these and other measurements refer to the Operating Instructions for the Model 3901 and appropriate module(s).

2. TURN ON AND INTERFACE

A. TURN ON

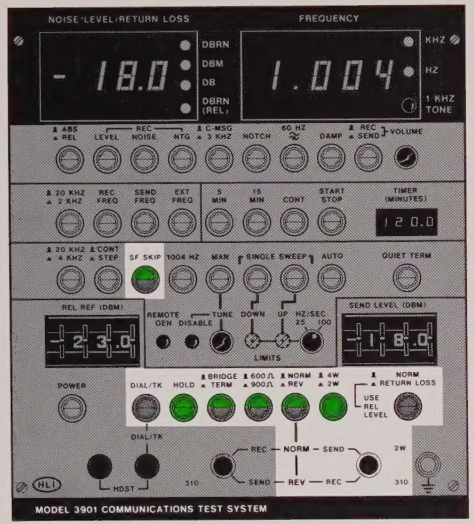
1. Set rear panel 115/230 switch to position that matches available line voltage.
2. Connect power cord to rear panel receptacle.
3. Set POWER to in position.



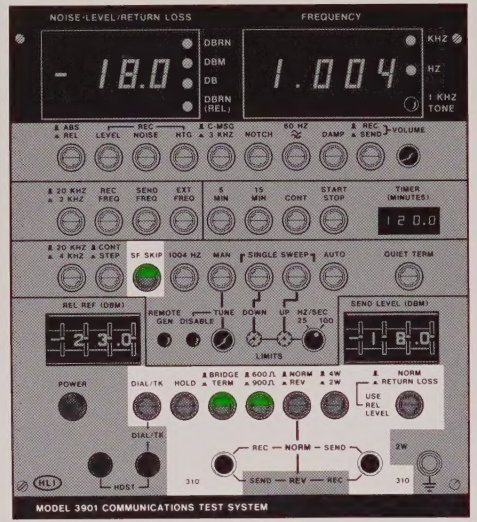


PART NO. 3901-M10
Issue 2, January 1978

B. 2-WIRE LINE INTERFACE
1. Set DIAL/TK to out position.
2. Set HOLD to in position.
3. a. Set BRIDGE/TERM to BRIDGE if bridging across the line.
   b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.
4. Set 600Ω/900Ω to match line impedance.
5. a. Set NORM/REV to NORM, to send.
   b. Set NORM/REV to REV, to receive.
6. Set 4W/2W to 2W.
7. Set NORM/RETURN LOSS to NORM.
8. Set SF SKIP to in position if SF signaling circuit is in the path.
9. Connect 2-wire line to 2W (NORM-SEND) 310 jack.



C. 4-WIRE LINE INTERFACE
1. Set DIAL/TK to out position.
2. Set HOLD to out position.
3. a. Set BRIDGE/TERM to BRIDGE if bridging across the line.
   b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.
4. Set 600Ω/900Ω to match line impedance.
5. Set NORM/REV to NORM.
6. Set 4W/2W to 4W.
7. Set NORM/RETURN LOSS to NORM.
8. Set SF SKIP to in position if SF signaling circuit is in the path.
9. a. Connect send line to NORM-SEND 310 jack.
   b. Connect receive line to NORM-REC 310 jack.



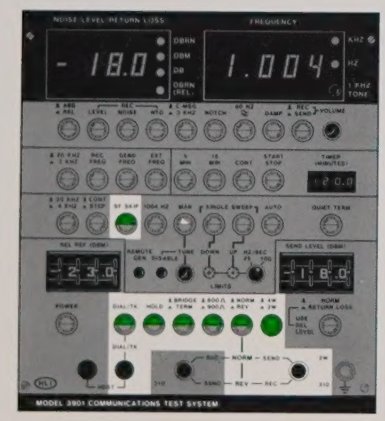
3. DIAL, TALK, HOLD AND LISTEN

A. TO CALL ON 2-WIRE LINE

1. Set HOLD to out position.
2. Set BRIDGE/TERM to BRIDGE.
3. Set 600Ω/900Ω to match line impedance.
4. Set NORM/REV to REV.
5. Set 4W/2W to 2W.
6. Set SF SKIP to in position if SF signaling circuit is in the path.
7. Connect line to 2W (NORM-SEND) jack.
8. Connect handset to DIAL/TK jack.
9. Set DIAL/TK to in position.
10. Dial-up using the handset.

TO RETURN TO TESTING MODE

11. Set HOLD to in position.
12. Set DIAL/TK to out position.
13. a. Set BRIDGE/TERM to BRIDGE if bridging across line.
    b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.
14. a. Set NORM/REV to NORM, to send.
    b. Set NORM/REV to REV, to receive.

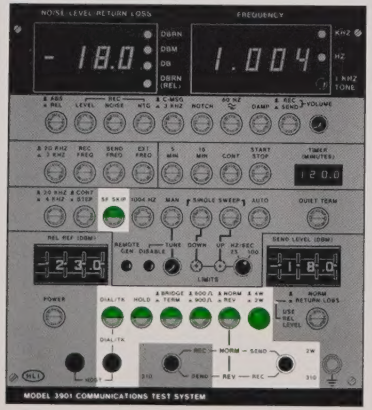


B. TO ANSWER ON 2-WIRE LINE

1. Set HOLD to out position.
2. Set BRIDGE/TERM to BRIDGE.
3. Set 600Ω/900Ω to match line impedance.
4. Set NORM/REV to REV.
5. Set 4W/2W to 2W.
6. Set SF SKIP to in position if SF signaling circuit is in the path.
7. Connect line to 2W (NORM-SEND) jack.
8. Connect handset to DIAL/TK jack. Put handset to on-hook mode.
9. Set DIAL/TK to in position.
10. Answer using the handset.

TO RETURN TO TESTING MODE

11. Set HOLD to in position.
12. Set DIAL/TK to out position.
13. a. Set BRIDGE/TERM to BRIDGE if bridging across line.
    b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.
14. a. Set NORM/REV to NORM, to send.
    b. Set NORM/REV to REV, to receive.

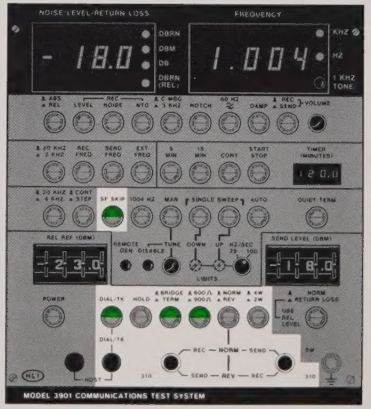


C. 4-WIRE LINE

1. Set HOLD to out position.
2. a. Set BRIDGE/TERM to BRIDGE if bridging across the line.
   b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.
3. Set 600Ω/900Ω to match line impedance.
4. Set NORM/REV to NORM.
5. Set 4W/2W to 4W.
6. Set SF SKIP to in position if SF signaling circuit is in the path.
7. a. Connect send line to NORM-SEND jack.
   b. Connect receive line to NORM-REC jack.
8. a. Connect handset to DIAL/TK jack.
   b. Connect headset to HDST jacks.
9. Set DIAL/TK to in position.

TO RETURN TO TESTING MODE

10. Set DIAL/TK to out position.



PART NO. 3901-M10
Issue 2, January 1978

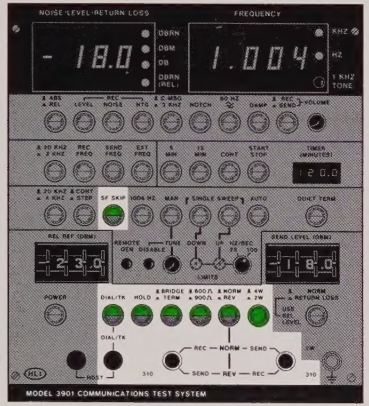
D. TO CALL ON DOUBLE 2-WIRE LINE

1. Set HOLD to out position.
2. Set BRIDGE/TERM to BRIDGE.
3. Set 600Ω/900Ω to match line impedance.
4. Set NORM/REV to NORM.
5. Set 4W/2W to 2W.
6. Set SF SKIP to in position if SF signaling circuit is in the path.
7. a. Connect send line to NORM-SEND jack.
   b. Connect receive line to NORM-REC jack.
8. Connect handset to DIAL/TK jack.
9. Set DIAL/TK to in position.
10. Dial-up using the handset.
11. Set HOLD to in position.
12. Set NORM/REV to REV.
13. Listen for dial-tone. If not present, go on-hook then off-hook.
14. Dial-up using handset.

TO RETURN TO TESTING MODE

15. Set DIAL/TK to out position.
16. Set NORM/REV to NORM.
17. a. Set BRIDGE/TERM to BRIDGE if bridging across line.
    b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.

(NOTE: With DIAL/TK to in position DIAL/TK jack is connected across REC jack.)



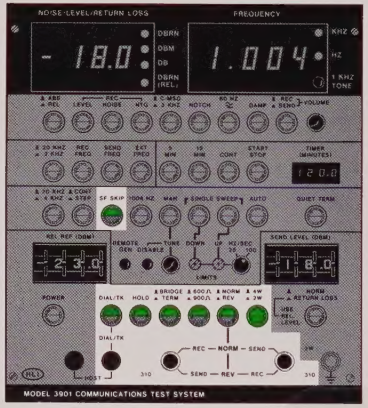
E. TO ANSWER ON DOUBLE 2-WIRE LINE

1. Set HOLD to out position.
2. Set BRIDGE/TERM to BRIDGE.
3. Set 600Ω/900Ω to match line impedance.
4. Set NORM/REV to REV.
5. Set 4W/2W to 2W.
6. Set SF SKIP to in position if SF signaling circuit is in the path.
7. a. Connect send line to NORM-SEND jack.
   b. Connect receive line to NORM-REC jack.
8. Connect handset to DIAL/TK jack.
9. Set DIAL/TK to in position.
10. Answer using the handset.
11. Set HOLD to in position.
12. Set NORM/REV to NORM.
13. Set handset to on-hook mode.
14. Answer using the handset.

TO RETURN TO TESTING MODE

15. Set DIAL/TK to out position.
16. a. Set BRIDGE/TERM to BRIDGE if bridging across line.
    b. Set BRIDGE/TERM to TERM if using the test set as the terminating impedance.

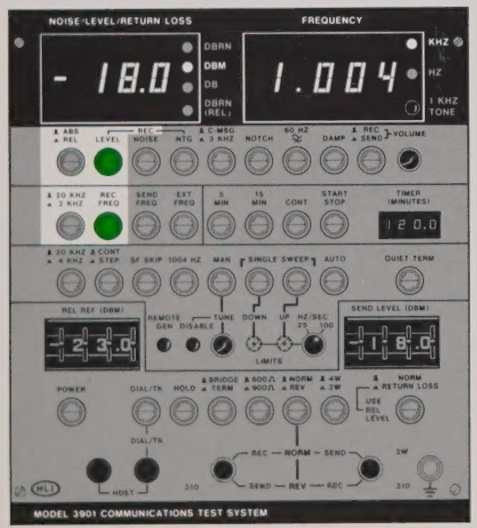
(NOTE: With DIAL/TK to in position DIAL/TK jack is connected across REC jack.)



4. LEVEL/FREQUENCY MEASUREMENT

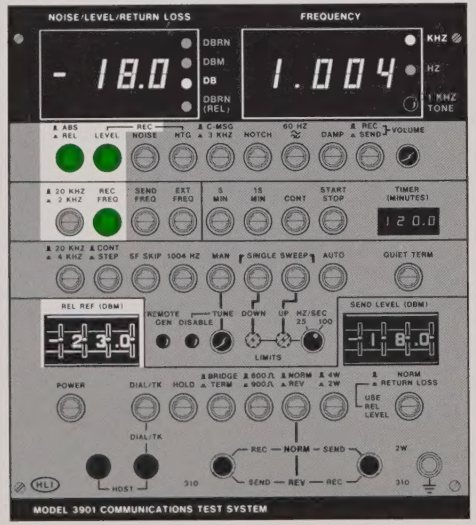
A. ABSOLUTE LEVEL/FREQUENCY — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to ABS.
3. Set REC-LEVEL to in position.
4. Set 20 KHZ/2 KHZ to 20 KHZ.
5. Set REC FREQ to in position.
6. Absolute receive level will be displayed in the LEVEL display window.
7. Receive frequency will be displayed in the FREQUENCY display window.



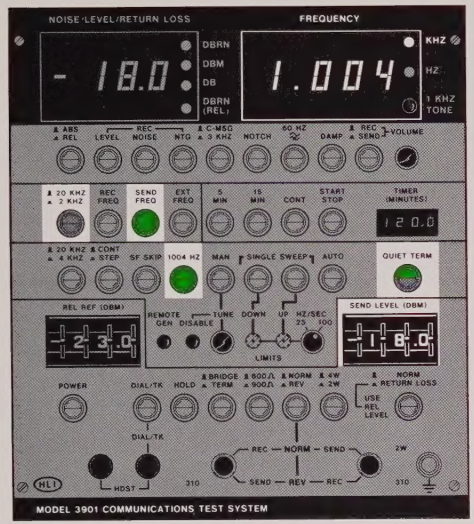
B. RELATIVE LEVEL/FREQUENCY — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to REL.
3. Set REC-LEVEL to in position.
4. Set REL REF (DBM) thumbwheels for the desired reference level (e.g., TLP, data level, etc.).
5. Set 20 KHZ/2 KHZ to 20 KHZ.
6. Set REC FREQ to in position.
7. Receive level relative to reference level will be displayed in the LEVEL display window.
8. Receive frequency will be displayed in the FREQUENCY display window.



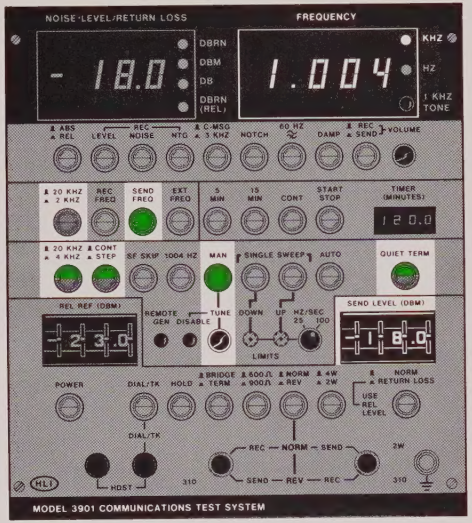
C. 1004 HZ FIXED FREQUENCY/LEVEL — SEND

1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.
3. Set SEND LEVEL (DBM) thumbwheels for desired send level.
4. Set 20 KHZ/2 KHZ to 20 KHZ.
5. Set SEND FREQ to in position.
6. Set 1004 HZ to in position.
7. Set QUIET TERM to out position.



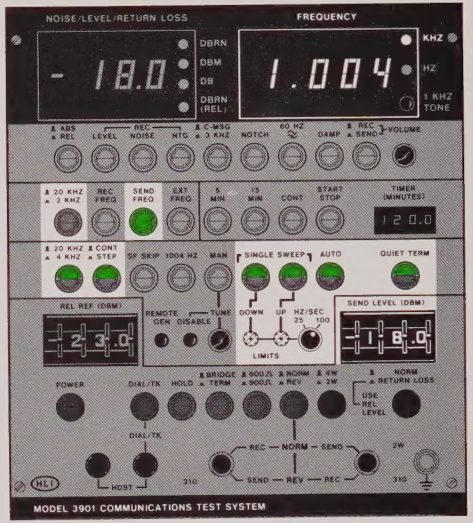
D. MANUALLY TUNED FREQUENCY/LEVEL — SEND

1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.
3. Set SEND LEVEL (DBM) thumbwheels for desired send level.
4. Set 20 KHZ/2 KHZ to 20 KHZ.
5. Set SEND FREQ to in position.
6. Set 20 KHZ/4 KHZ to desired send frequency range.
7. a. Set CONT/STEP to CONT for continuous frequency adjustment.
   b. Set CONT/STEP to STEP for frequency adjustment in 100 Hz steps.
8. Set MAN to in position.
9. Adjust TUNE for desired frequency.
10. Set QUIET TERM to out position.



E. SWEPT FREQUENCY/LEVEL — SEND

1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.
3. Set SEND LEVEL (DBM) thumbwheels for desired send level.
4. Set 20 KHZ/2 KHZ to 20 KHZ.
5. Set SEND FREQ to in position.
6. Set 20 KHZ/4 KHZ to desired send frequency range.
7. a. Set CONT/STEP to CONT for continuous sweep.
   b. Set CONT/STEP to STEP for 100 Hz step sweep.
8. Set SINGLE SWEEP DOWN to in position.
9. Adjust DOWN LIMIT for desired low frequency limit.
10. Set SINGLE SWEEP UP to in position.
11. Adjust UP LIMIT for desired high frequency limit.
12. Set AUTO to in position.
13. Adjust HZ/SEC for desired sweep rate.
14. Set QUIET TERM to out position.



5. NOISE/FREQUENCY MEASUREMENT

A. ABSOLUTE NOISE C-MSG (3KHZ) WITHOUT TONE — RECEIVE

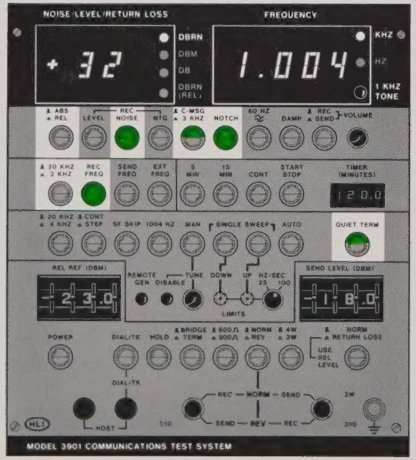
1. Perform line interface in Section 2.
2. Set ABS/REL to ABS.
3. Set REC-NOISE to in position.
4. Set C-MSG/3KHZ to C-MSG (3 KHZ).
5. Set NOTCH to out position.
6. Absolute receive noise will be displayed in the NOISE display window.

(NOTE: For low level noise measurements set QUIET TERM to in position.)

B. ABSOLUTE NOISE C-MSG (3 KHZ) WITH TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to ABS.
3. Set REC-NOISE to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH to in position.
6. Set 20 KHZ/2 KHZ to 20 KHZ.
7. Set REC-FREQ to in position.
8. Absolute receive noise will be displayed in the NOISE display window.
9. Receive frequency will be displayed in the FREQUENCY display window.

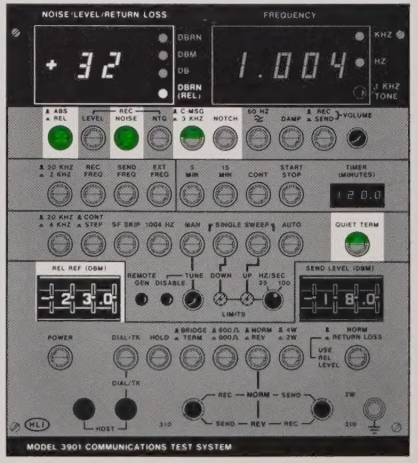
(NOTE: For low level noise measurements set QUIET TERM to in position.)



C. RELATIVE NOISE C-MSG (3 KHZ) WITHOUT TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to REL.
3. Set REC-NOISE to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH to out position.
6. Set REL REF (DBM) thumbwheels for the desired reference level (e.g., TLP, data level, etc.).
7. Receive noise relative to reference level will be displayed in the NOISE display window.

(NOTE: For low level noise measurements set QUIET TERM to in position.)

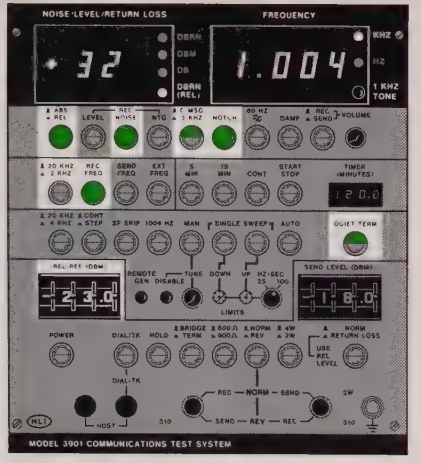


PART NO. 3901-M10
Issue 2, January 1978

D. RELATIVE NOISE C-MSG (3 KHZ) WITH TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to REL.
3. Set REC-NOISE to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH to in position.
6. Set 20 KHZ/2 KHZ to 20 KHZ.
7. Set REC FREQ to in position.
8. Set REL REF (DBM) thumbwheels for the desired reference level (e.g., TLP, data level, etc.).
9. Receive noise relative to reference level will be displayed in the NOISE display window.
10. Receive frequency will be displayed in the FREQUENCY display window.

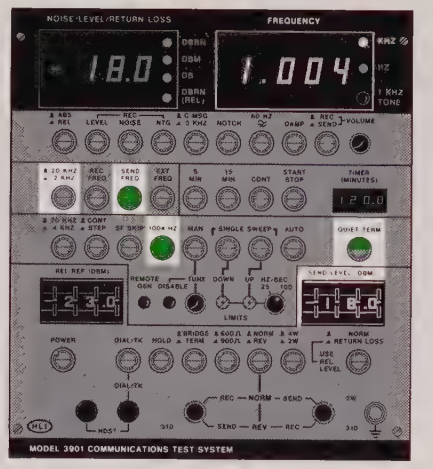
(NOTE: For low level noise measurements set QUIET TERM to in position.)



E. 1004 HZ FIXED FREQUENCY/LEVEL — SEND

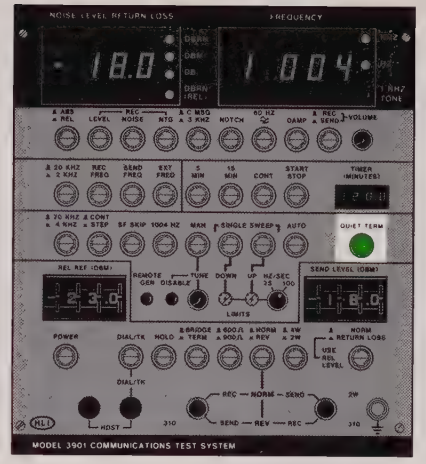
1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.
3. Set SEND LEVEL (DBM) thumbwheels for desired send level.
4. Set 20 KHZ/2 KHZ to 20 KHZ.
5. Set SEND FREQ to in position.
6. Set 1004 HZ to in position.
7. Set QUIET TERM to out position.

(NOTE: Other frequencies and/or swept frequencies can be set up as needed per Section 4D and 4E.)



F. QUIET TERMINATION — SEND

1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.

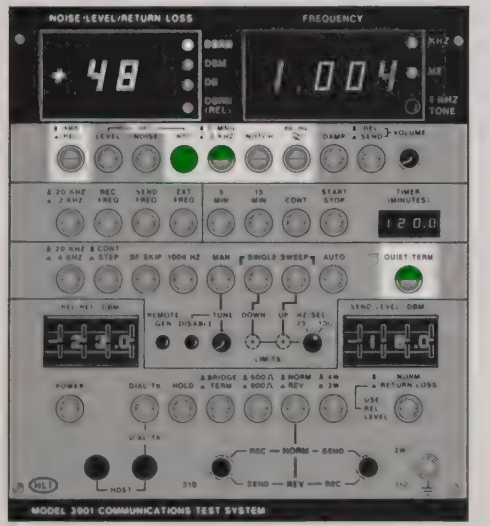


6. NOISE-TO-GROUND MEASUREMENT

A. ABSOLUTE NTG C-MSG (3 KHZ) WITHOUT TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to ABS.
3. Set REC-NTG to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH to in position.
6. Set 60 HZ ≈ to out position.
7. Absolute receive noise-to-ground will be displayed in the NOISE display window.

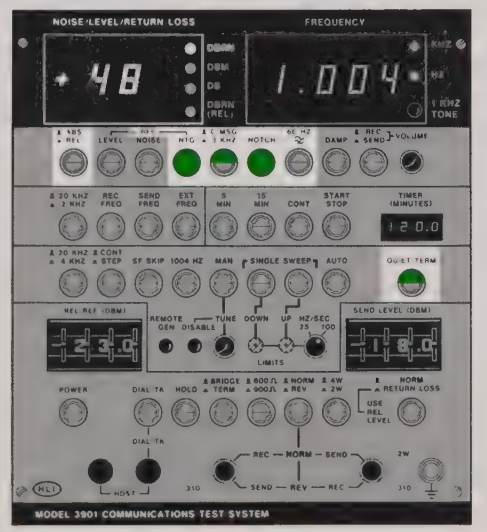
(NOTE: For low level noise-to-ground measurements set QUIET TERM to in position.)



B. ABSOLUTE NTG C-MSG (3KHZ) WITH TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to ABS.
3. Set REC-NTG to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH to in position.
6. Set 60 Hz ≈ to out position.
7. Absolute receive noise-to-ground will be displayed in the NOISE display window.

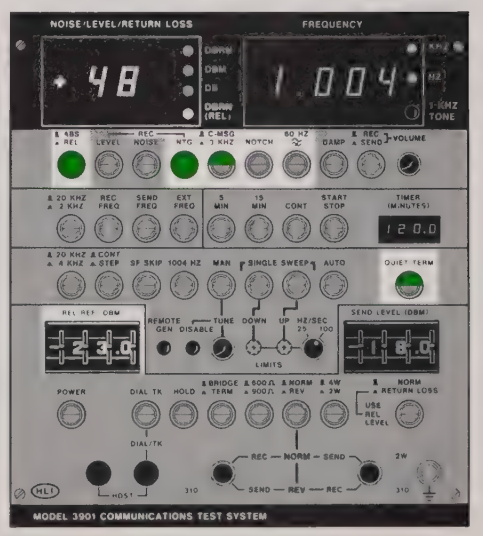
(NOTE: For low level noise-to-ground measurements set QUIET TERM to in position.)



C. RELATIVE NTG C-MSG (3 KHZ) WITHOUT TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to REL.
3. Set REC-NTG to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH to out position.
6. Set 60 HZ ≈ to out position.
7. Set REL REF (DBM) thumbwheels for the desired reference level (e.g., TLP, data level, etc.).
8. Noise-to-ground relative to reference level will be displayed in the NOISE display window.

(NOTE: For low level noise-to-ground measurements set QUIET TERM to in position.)

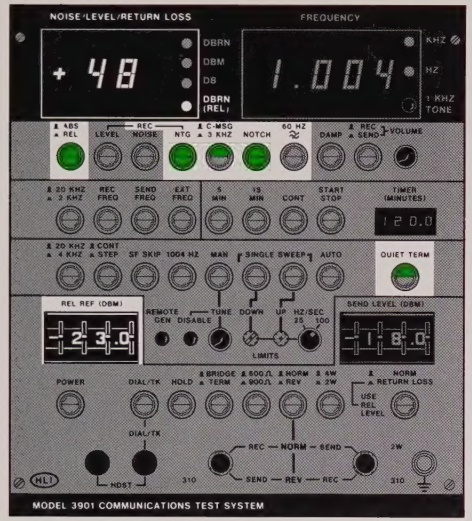


PART NO. 3901-M10
Issue 2, January 1978

D. RELATIVE NTG C-MSG (3 KHZ) WITH TONE — RECEIVE

1. Perform line interface in Section 2.
2. Set ABS/REL to REL.
3. Set REC-NTG to in position.
4. Set C-MSG/3 KHZ to C-MSG (3 KHZ).
5. Set NOTCH TO in position.
6. Set 60 HZ ≈ to out position.
7. Set REL REF (DBM) thumbwheels for the desired reference level (e.g., TLP, data level, etc.).
8. Noise-to-ground relative to reference level will be displayed in the NOISE display window.

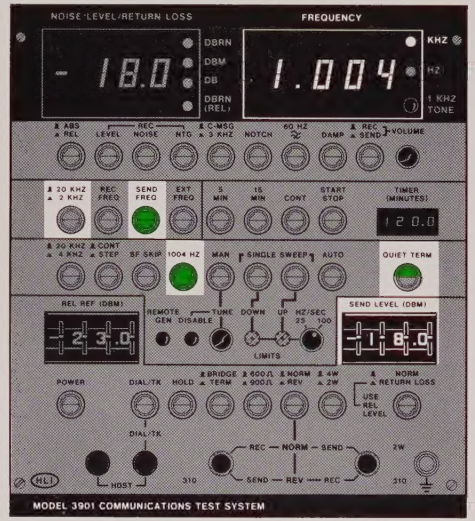
(NOTE: For low level noise-to-ground measurements set QUIET TERM to in position.)



E. 1004 HZ FIXED FREQUENCY/LEVEL — SEND

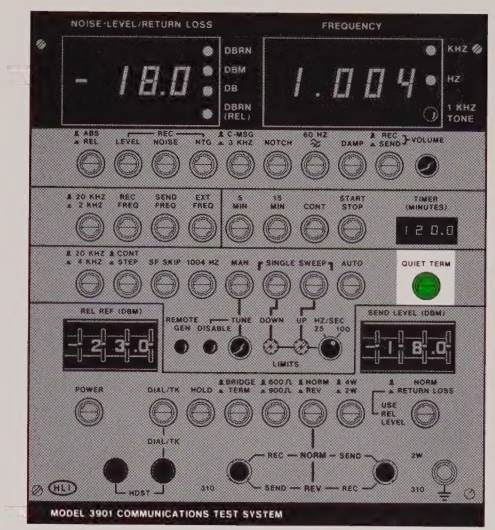
1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.
3. Set SEND LEVEL (DBM) thumbwheels for desired send level.
4. Set 20 KHZ/2 KHZ to 20 KHZ.
5. Set SEND FREQ to in position.
6. Set 1004 HZ to in position.
7. Set QUIET TERM to out position.

(NOTE: Other frequencies and/or swept frequencies can be set-up as needed per Section 4D and 4E.)



F. QUIET TERMINATION — SEND

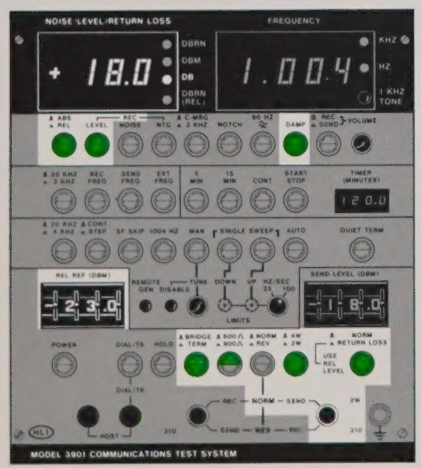
1. Perform line interface in Section 2.
2. Set QUIET TERM to in position.



7. RETURN LOSS — SINE-WAVE

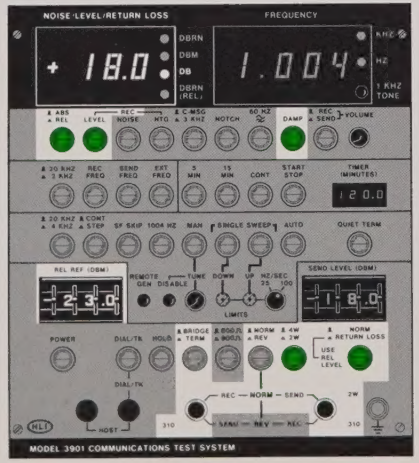
A. 2-WIRE USING INTERNAL STANDARD — RECEIVE

1. Set desired frequency and level (refer to Section D or E).
2. Set REL REF (DBM) thumbwheels for —10.0 DBM.
3. Connect line to be tested to 2W (NORM-SEND) 310 jack.
4. If dial-up connection has to be made perform "TO CALL ON 2-WIRE LINE" procedure in Section 3A steps 1 thru 12.
5. Set BRIDGE/TERM to TERM.
6. Set 600Ω/900Ω to match line impedance.
7. Set NORM/REV to NORM.
8. Set 4W/2W to 2W.
9. Set NORM/RETURN LOSS to RETURN LOSS.
10. Set ABS/REL to REL.
11. Set REC-LEVEL to in position.
12. Set DAMP to in position.
13. Return loss will be displayed in the RETURN LOSS display window.



B. 2-WIRE USING EXTERNAL STANDARD — RECEIVE

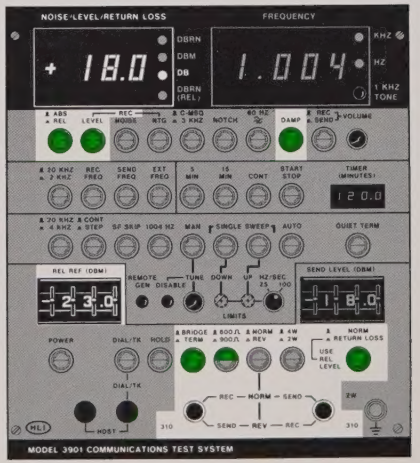
1. Set desired frequency and level (refer to Section D or E).
2. Set REL REF (DBM) thumbwheels for —10.0 DBM.
3. Connect external standard to NORM-REC 310 jack.
4. Connect line to be tested to 2W (NORM-SEND) 310 jack.
5. If dial-up connection has to be made perform "TO CALL ON 2-WIRE LINE" procedure in Section 3A steps 1 thru 12.
6. Set BRIDGE/TERM to BRIDGE.
7. Set NORM/REV to NORM.
8. Set 4W/2W to 2W.
9. Set NORM/RETURN LOSS to RETURN LOSS.
10. Set ABS/REL to REL.
11. Set REC LEVEL to in position.
12. Set DAMP to in position.
13. Return loss will be displayed in the RETURN LOSS display window.



C. 4-WIRE — RECEIVE

1. Set BRIDGE/TERM to TERM.
2. Set 600Ω/900Ω to match line impedance.
3. Set NORM/REV to NORM.
4. Set 4W/2W to 4W.
5. Set NORM/RETURN LOSS to RETURN LOSS.
6. a. Connect send lines to NORM-SEND 310 jack.
   b. Connect receive lines to NORM-REC 310 jack.
7. Select desired frequency and level (refer to D and E).
8. Set ABS/REL to REL.
9. Set DAMP to in position.
10. Set REC-LEVEL to in position.
11. Short or open 2 wire side of hybrid.
12. Set REL REF (DBM) thumbwheels for a display reading of 0.0 DB.
13. Terminate 2 wire side of hybrid.
14. Return loss will be displayed in the RETURN LOSS display window.

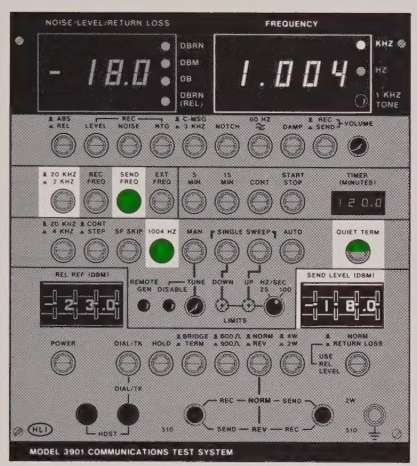
(NOTE: If frequency is changed repeat steps 11 thru 13.)



PART NO. 3901-M10
Issue 2, January 1978

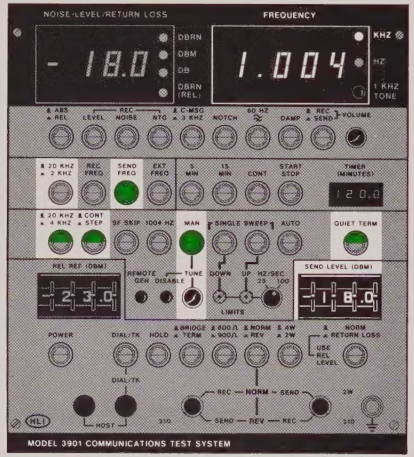
D. 1004 HZ FIXED FREQUENCY/LEVEL — SEND

1. Set QUIET TERM to in position.
2. Set SEND LEVEL (DBM) thumbwheels for —10.0 DBM.
3. Set 20 KHZ/2 KHZ to 20 KHZ.
4. Set SEND FREQ to in position.
5. Set 1004 HZ to in position.
6. Set QUIET TERM to out position.



E. MANUALLY TUNED FREQUENCY/LEVEL — SEND

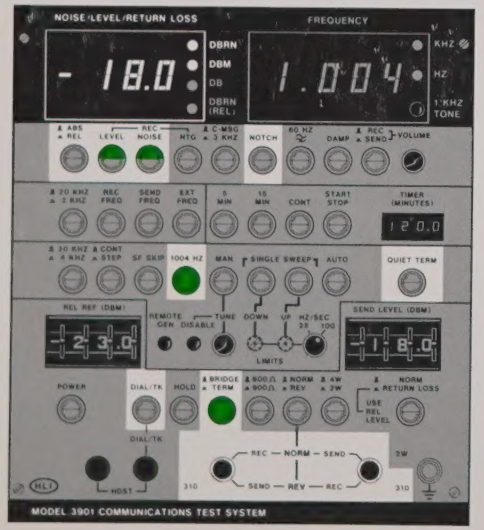
1. Set QUIET TERM to in position.
2. Set SEND LEVEL (DBM) thumbwheels for —10.0 DBM.
3. Set 20 KHZ/2 KHZ to 20 KHZ.
4. Set SEND FREQ to in position.
5. Set 20 KHZ/4 KHZ to desired send frequency range.
6. a. Set CONT/STEP to CONT for continuous frequency adjustment.
   b. Set CONT/STEP to STEP for frequency adjustment in 100 Hz steps.
7. Set MAN to in position.
8. Adjust TUNE for desired frequency.
9. Set QUIET TERM to out position.



8. SELF TEST

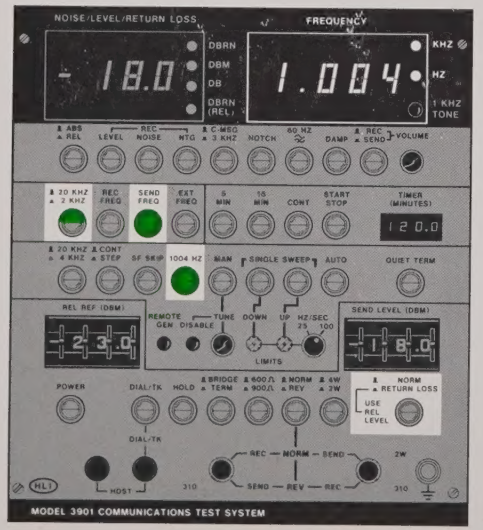
A. REC LEVEL/NOISE CHECK

1. Set ABS/REL to ABS.
2. Set REC-LEVEL to in position.
3. Set NOTCH to out position.
4. Set 1004 HZ to in position.
5. Set DIAL/TK to out position.
6. Set BRIDGE/TERM to TERM.
7. Set SEND LEVEL (DBM) thumbwheels to —00.0.
8. Loop NORM-SEND 310 jack to NORM-REC 310 jack.
9. Note LEVEL display reads —0.0 ±0.2 DBM.
10. Set REC-NOISE to in position.
11. Note NOISE display reads +90 ±1 DBRN.



B. FREQUENCY COUNTER CHECK

1. Set 20 KHZ/2 KHZ to 20 KHZ.
2. Set SEND FREQ to in position.
3. Set 1004 HZ to in position.
4. Set NORM/RETURN LOSS to NORM.
5. Note FREQUENCY display reads 1.004 ±0.001 KHZ.
6. Set 20 KHZ/2 KHZ to 2 KHZ.
7. Note FREQUENCY display reads 1004.0 ±0.1 HZ.



C. GENERATOR CHECK

1. Set 20 KHZ/2 KHZ to 20 KHZ.
2. Set SEND FREQ to in position.
3. Set 20 KHZ/4 KHZ to 20 KHZ.
4. Set CONT/STEP to CONT.
5. Set MAN to in position.
6. Turn TUNE clockwise and note that frequency increases.
7. Turn TUNE counterclockwise and note that frequency decreases.
8. Set DOWN LIMIT fully counterclockwise.
9. Set UP LIMIT fully clockwise.
10. Set AUTO to in position.
11. Turn HZ/SEC fully clockwise.
12. Note frequency sweeps up and down.